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(56) Documents cited
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INT CL[5] H01J

(54) **Shadow mask for a cathode-ray tube**

(57) A shadow mask for cathode-ray tube includes a central apertured area 32, a non-apertured border 33, and a skirt portion 33a, and a plurality of stripe type grooves 34, 34' are provided alternately formed on the top and bottom surfaces of the non-apertured border 33 and the skirt portion 33a. The provision of the stripe type grooves 34, 34' facilitates the plastic deformation in forming the skirt portion 33a by bending, thereby eliminating the occurrence of spring-back phenomena in the skirt portion 33a after press-forming. The grooves 34, 34' may be formed during the etching process which forms the beam transmissive apertures 31 in the central area 32 of the shadow mast.

FIG.4

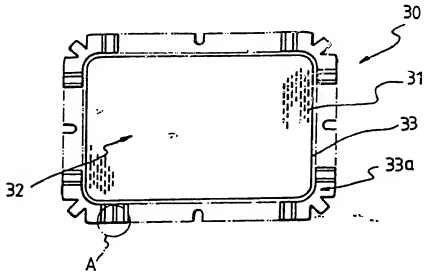

FIG.5

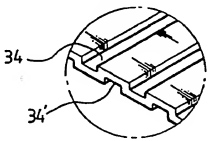

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FIG.1 (Prior Art)

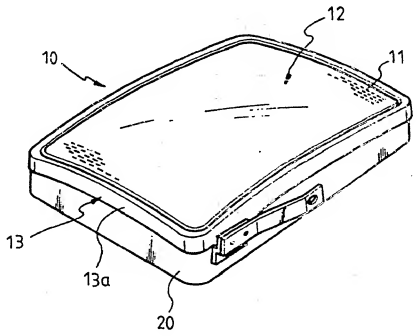


FIG.2 (Prior Art)

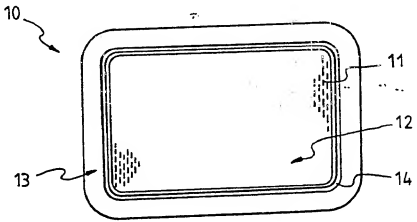


FIG. 3

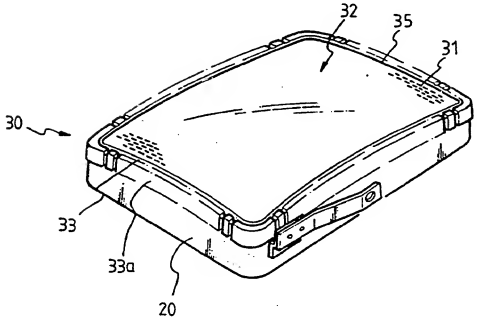


FIG. 4

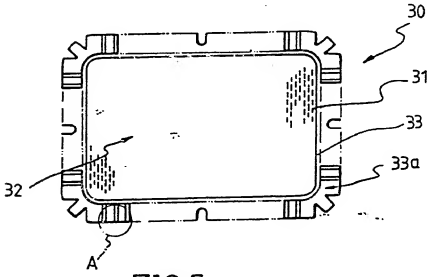
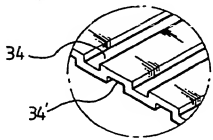


FIG. 5



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SHADOW MASK FOR A CATHODE-RAY TUBE

The present invention relates to an improved shadow mask for a cathode-ray tube which is adapted effectively to suppress spring-back phenomena occurring in the skirt portion thereof.

A shadow mask is typically suspended within a cathode-ray tube envelope adjacent the phosphor screen on the inner surface of a panel. The shadow mask functions as a color selection electrode which filters the scanning electron beams projected from an electron gun incorporated in the neck of a funnel to the phosphor screen.

The conventional shadow mask 10 depicted in Fig. 1 of the accompanying drawings comprises a central apertured area 12 having a pattern of electron beam transmissive apertures 11, a non-apertured border 13 surrounding the central apertured area 12, a skirt portion 13a formed along the periphery of the non-apertured border 13 substantially perpendicular to the central apertured area and a ridge 14 formed along the periphery of the central apertured area 12 in the non-apertured border 13 for reinforcing the shadow mask 10. The skirt portion 13a serves as a welding portion for attaching the shadow mask 10 to a frame 20.

The shadow mask 10 is formed dish shaped with a flat thin blank of metal as shown in Fig. 2 through a press-forming process. The press-forming process comprises the steps of drawing the blank of metal consisting of the central apertured area 12 together with the non-apertured border 13 into a dome shape, and bending the periphery of the non-apertured border 13

to form the skirt portion 13a. Here, the aforesaid steps are successively performed in one press machine.

However, the shadow mask formed by press-forming has a problem in that spring-back phenomena partially occurs in the shadow mask because a complete plastic deformation is not achieved in press-forming the bending portion.

The spring-back phenomena which arise chiefly in the skirt portion, make it difficult to weld the shadow mask accurately to the frame due to loose contact with each other.

If the skirt portion and the frame having a wide gap between them, are forcibly welded together, the skirt portion is partially deformed to cause the central apertured area and the non-apertured border to be distorted.

In particular, the central apertured area having a plurality of electron beam passing apertures is extremely fragile in structure as compared with the non-apertured border or the skirt portion, so that the central apertured area is distorted leading the electron beam transmissive apertures to be misarranged. As a result, the filtering of electron beams through the electron beam transmissive apertures is not accurately performed, thereby, worsening the color purities of the screen image formed on the phosphor screen.

Therefore, it is an object of the present invention to provide an improved shadow mask for a cathode ray tube which is adapted to suppress remarkably the spring-back phenomena, and thereby to provide a cathode-ray tube in which worsening in color purities is prevented.

According to the present invention there is provided

a shadow mask for a said shadow cathode-ray tube mask including an electron beam transmissive domed plane for location substantially perpendicular to an electron beam path, the domed plane having a central apertured area with a pattern of electron beam transmissive apertures and a non-apertured border, and a skirt portion along the periphery of the non-apertured border, wherein a plurality of stripe type grooves are formed on both top and bottom surfaces of the non-apertured border and the skirt portion so that the grooves on the top surface and the grooves on the bottom surface of the non-apertured border and the skirt portion are alternately disposed with respect to one another, whereby eliminating spring-back phenomena occurring in the skirt portion after press-forming process.

Embodiments of the present invention will now be described, by way of example with reference to the accompanying drawings, in which:

FIG. 1 is a schematic perspective view of a conventional shadow mask attached to a frame for supporting the shadow mask;

FIG. 2 is a plan view of a blank for the shadow mask shown in Fig. 1 prior to a press-forming process;

FIG. 3 is a perspective view of a shadow mask according to an embodiment of the present invention attached to a frame for supporting the shadow mask;

FIG. 4 is a plan view of a blank for the shadow mask shown in Fig. 3 prior to a press-forming process; and

FIG. 5 is an extracted enlarged perspective view of the blank of the shadow mask shown in Fig. 4.

Fig. 3 shows a shadow mask 30 according to an embodiment of the present invention which is attached to a frame.

The shadow mask 30 which is the same as a typical shadow mask, comprises an electron beam transmissive domed plane which will be disposed substantially perpendicular to the electron beam path of a cathode ray tube and has a central apertured area 32 with a pattern of electron beam transmissive apertures 31 and a non- apertured border 33, a skirt portion 33a formed along the periphery of the non-apertured border 33 substantially perpendicular to the central apertured area, and a ridge 35 formed along the periphery of the central apertured area 32 in the non-apertured border 33 for reinforcing the shadow mask 30. The skirt portion 33a which is an extension of the non-apertured border 33 is directly welded to the frame 20.

In this embodiment of the present invention, a plurality of stripe type grooves 34 and 34' depicted in Fig. 5, are alternately provided on both top and bottom surfaces of the non-apertured border 33 and the skirt portion 33a to be perpendicular with respect to the periphery of the central apertured area 32 or the electron beam transmissive plane.

In addition, the shadow mask 30 is shaped by press-forming with a flat thin blank of metal which is previously formed with a plurality of beam transmitting apertures as depicted in Fig. 4. A plurality of stripe type grooves 34 and 34' are also previously formed on the non-apertured border 33 and the skirt portion 33a during etching process for a pattern of the electron beam transmissive apertures 31.

Through the press-forming, the blank of metal having

the central apertured area together with the non-apertured border is formed into a domed configuration, and the outer periphery of the non-apertured border is bent to form the skirt portion in sucessive steps by one press machine.

According to the present invention as described above, the provision of the stripe type grooves makes the skirt portion and the non-apertured border of the shadow mask relatively weak in mechanical strength as compared with the conventional shadow mask, so that the non-apertured border and the skirt portion are easily plastically deformed, to prevent the occurrence of the spring-back phenomena in the skirt portion.

Furthermore, the stripe type grooves are alternately formed on both top and bottom surfaces of the skirt portion and also are disposed toward the central apertured area, thereby avoiding wrinkling of the skirt portion.

In the welding operation, the skirt portion of the shadow mask abuts on each side surface of the frame without gap, and thus welding the shadow mask to the frame is perfectly executed to prevent the misalignment of the electron beam transmissive apertures of the central apertured area.

Consequently, the shadow mask according to the present invention is easy to manufacture, and can prevent the color cathode-ray tube from worsening in screen image due to the distortion of the central apertured area of the shadow mask.

The present invention has been described with reference to a specific embodiment, but it will be understood by those skilled in the art that changes and modifications can be made without departing from the scope of the present invention.

CLAIMS:

1. A shadow mask for a cathode-ray tube, the shadow mask including an electron beam transmissive domed plane for disposal substantially perpendicular to an electron beam path, said domed plane having a central apertured area with a pattern of electron beam transmissive apertures and a non-apertured border, and a skirt portion formed along the periphery of said non-apertured border, wherein a plurality of stripe type grooves are provided on both top and bottom surfaces of said non-apertured border and said skirt portion such that said grooves on the top surface alternate with those on the bottom surface, whereby spring-back phenomena occurring in said skirt portion after press-forming is eliminated.

2. A shadow mask for a cathode-ray tube, substantially as hereinbefore described with reference to Figures 3 and 4 of the accompanying drawings.

3. A cathode-ray tube comprising a shadow mask as claimed in any preceding claim.

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